GRADE 12
DIPLOMA EXAMINATION

Mathematics 30

June 1992

Alberta
EDUCATION

GRADE 12 DIPLOMA EXAMINATION
MATHEMATICS 30

DESCRIPTION

Time allotted: 2.5 hours

Total possible marks: 67

This is a **closed-book** examination consisting of **three** parts:

  PART A has 40 multiple-choice questions each with a value of one mark.

  PART B has seven numerical-response questions each with a value of one mark.

  PART C has four written-response questions for a total of 20 marks.

A tear-out formula sheet, z-score page, and 90% Box Plot Graphs are included in this booklet.

> NOTE: The perforated pages at the back of this booklet may be torn out and used for your rough work. **No marks** will be given for work done on the tear-out pages.

GENERAL INSTRUCTIONS

Fill in the information required on the answer sheet and the examination booklet as directed by the presiding examiner.
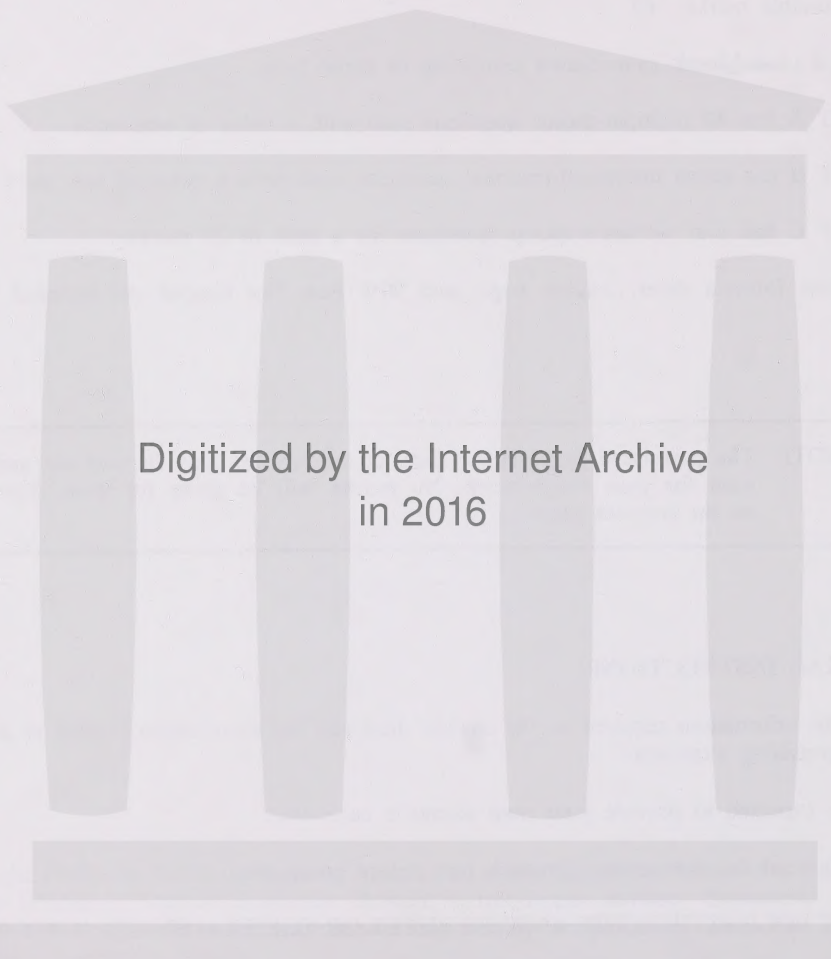
You are expected to provide your own scientific calculator.

Carefully read the instructions for each part before proceeding.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE EXAMINATION BOOKLET.

The presiding examiner will collect your answer sheet and examination booklet and send them to Alberta Education.

JUNE 1992

Digitized by the Internet Archive
in 2016

PART A

Example	**Answer Sheet**

This diploma examination is for the subject of   Ⓐ   Ⓑ   Ⓒ   ●

A. biology
B. physics
C. chemistry
D. mathematics

If you wish to change an answer, erase your first mark completely.

DO NOT TURN THE PAGE TO START THE EXAMINATION UNTIL TOLD TO DO SO BY THE PRESIDING EXAMINER.

1. If $P\left(-\frac{2}{3}\right) = 0$, then one factor of the polynomial $P(x)$ is

   A. $3x + 2$
   B. $3x - 2$
   C. $2x + 3$
   D. $2x - 3$

2. The graph of $P(x) = a(x - p)(x - q)(x - r)$, as represented below, is displayed on a computer screen. Pat's assignment is to find the value of a. From the graph, Pat notes that the x-intercepts are -1, -2, and 4.
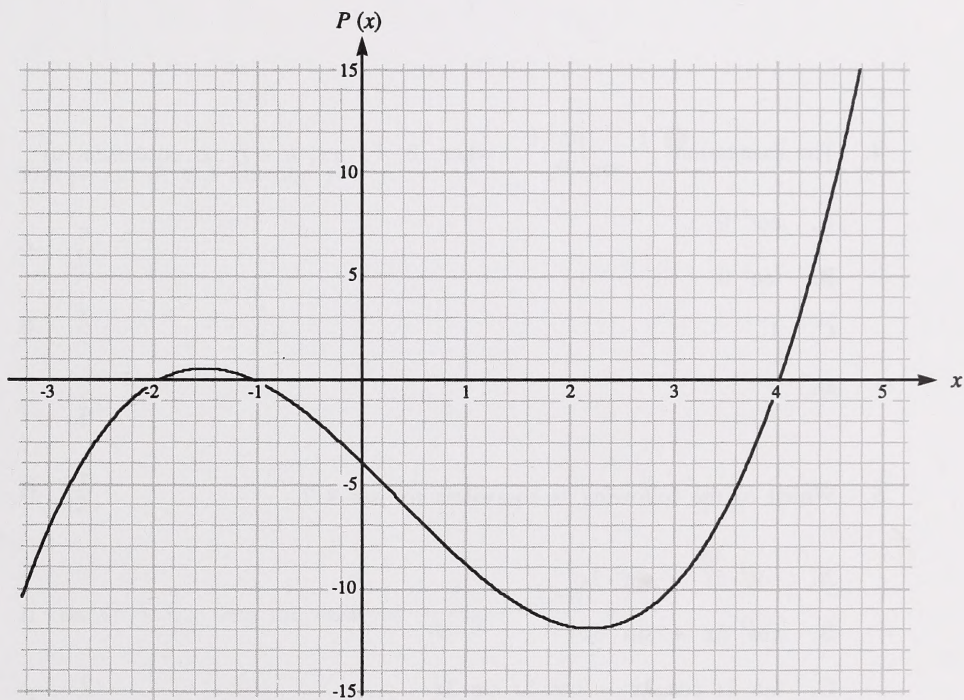
Pat finds that the value of a is

   A. $\dfrac{3}{4}$

   B. $\dfrac{1}{2}$

   C. -4

   D. -10

3. The graph of $f(\theta) = 4 \cos \theta$ is shown below. The range of this function is

A. $-4 \leq f(\theta) \leq 4$

B. $-4 \leq f(\theta) \leq 0$

C. $0 \leq f(\theta) \leq 4$

D. $0 \leq f(\theta) \leq 2\pi$
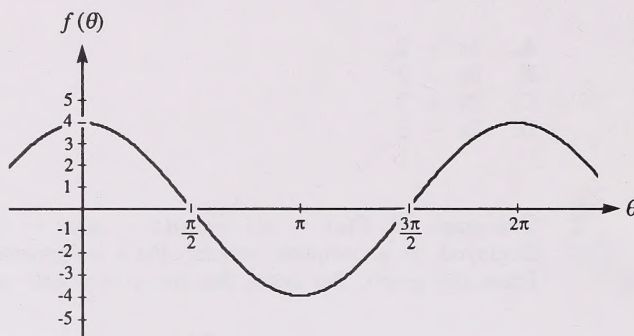
4. The expression $\dfrac{1 - \sin^2 \theta}{\sin^2 \theta}$, where $\theta \neq n\pi$, $n \in I$, is equivalent to

A. $\cot^2 \theta$

B. $\tan^2 \theta$

C. 1

D. 0

5. Which of the following is equivalent to $\sin 8x$?

A. $\cos^2 5x - \sin^2 3x$

B. $\cos^2 5x + \sin^2 3x$

C. $\sin 5x \cos 3x - \cos 5x \sin 3x$

D. $\sin 5x \cos 3x + \cos 5x \sin 3x$

6. On a circle with a radius of 4.1 cm, an arc of 18.3 cm subtends a central angle θ. The measure of θ correct to the nearest tenth of a degree is

A. $258.9°$
B. $256.9°$
C. $255.7°$
D. $254.4°$

7. The graph of a trigonometric function, as represented below, is displayed on a computer screen.
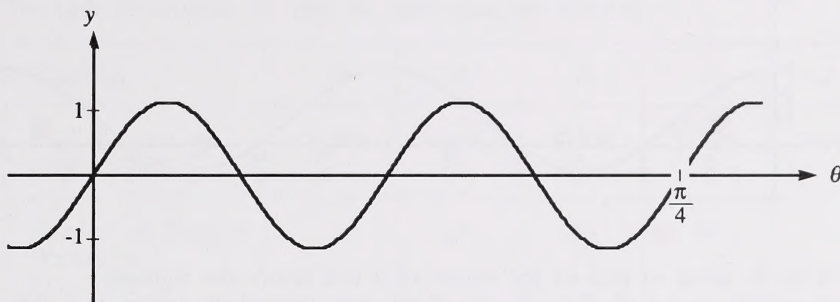
The period of this function is

A. $\dfrac{\pi}{16}$

B. $\dfrac{\pi}{8}$

C. $\dfrac{\pi}{4}$

D. $\dfrac{\pi}{2}$

8. If $\sin \theta = \dfrac{2}{3}$, then the value of $\dfrac{3}{\csc \theta} + \dfrac{\csc \theta}{6}$ is

A. $\dfrac{1}{2}$

B. $\dfrac{3}{2}$

C. $\dfrac{9}{4}$

D. $\dfrac{83}{18}$

9. The graph of $f(\theta) = 2\cos(2\theta) + 1$, as represented below, is displayed on a computer screen.
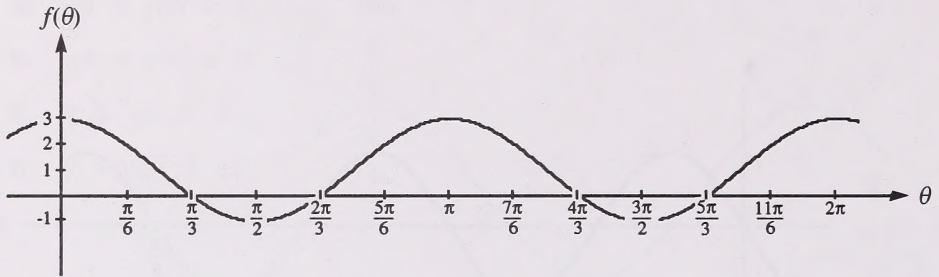
Kelly is asked to find all the values of θ that satisfy the equation $2\cos(2\theta) = -1$, $0 \leqq \theta \leqq 2\pi$. Kelly finds that all the values of θ that satisfy this equation are

A. $\dfrac{\pi}{2}, \dfrac{3\pi}{2}$

B. $\dfrac{2\pi}{3}, \dfrac{4\pi}{3}$

C. $\dfrac{\pi}{6}, \dfrac{5\pi}{6}, \dfrac{7\pi}{6}, \dfrac{11\pi}{6}$

D. $\dfrac{\pi}{3}, \dfrac{2\pi}{3}, \dfrac{4\pi}{3}, \dfrac{5\pi}{3}$

10. The results of a test are normally distributed with a mean of 67.5 and a standard deviation of 15. If a score is selected at random, then the probability that this score is between 75 and 90 is

A. 0.0668
B. 0.2417
C. 0.3753
D. 0.6247

11. A manufacturer that guarantees its car tires for 80 000 km finds that 2.5% of the tires are returned under the warranty. Assuming a normal distribution and a standard deviation of 1250 km, the mean life of the tires correct to the nearest kilometre is

A. 81 250 km
B. 82 000 km
C. 82 450 km
D. 83 125 km

-4-

12. A bank manager wanted to determine if a customer's balance at the beginning of a month could be used to predict the number of cheques the customer would write during that one-month period. The bank manager decided to monitor the number of cheques that five customers wrote in the month of May 1992. The table summarizes the data the bank manager collected:

Customer	P	Q	R	S	T
Bank Balance on May 1, 1992	$1300	$1800	$2300	$2500	$4000
Number of Cheques Written in May 1992	9	20	40	24	10

The bank manager also has a customer L, whose bank balance on June 1, 1992, is $2400. Which of the following statements **best** describes the predictability of cheque-writing by customer L in the month of June?

A. We can predict that customer L will write 32 cheques in June.

B. We can predict that customer L will write 42 cheques in June.

C. We cannot predict how many cheques customer L will write because customer L's balance is outside the range of the sample.

D. We cannot predict how many cheques customer L will write because the data required are the cheque-writing behavior of customer L.

---

13. The scores of an examination are normally distributed. The diagram at the right indicates the number of students who received scores below the mean or above a particular z-score. The z-score is

1250

255

0   z

z-scores
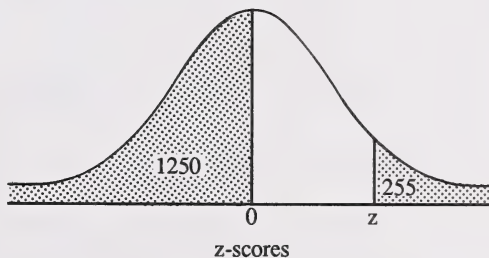
A. 0.20
B. 0.40
C. 0.66
D. 1.27

14. A particular school has an enrolment of 60% females. Random samples of 20 students are drawn from the students of this particular school. Based on a 90% confidence level, the proportion of females in such a sample will likely range from

- **A.** 0.05 - 0.35
- **B.** 0.30 - 0.85
- **C.** 0.40 - 0.80
- **D.** 0.50 - 0.90

15. Four students are discussing the sample size needed to complete their statistics project in Mathematics 30. Each student makes a different statement about the size of the sample. Which statement is correct?

- **A.** The sample size must always be between 20% and 40% of the population size.

- **B.** The sample size must always be at least 50% of the population size.

- **C.** The sample size can vary; it must be small if the sample is randomly chosen but must be large with a nonrandom sample.

- **D.** The sample size can vary depending upon both the size of the population being sampled and the type of sampling process used.

16. Two research companies, Sigmas and Nolies, each polled 500 different teachers to determine whether the school year should be extended to 12 months. The two companies published the following results:

> Sigmas' poll finds 29% of teachers say "yes" to an extended school year.

> Nolies' poll finds 32% of teachers say "yes" to an extended school year (accurate to within 4 percentage points, 19 times out of 20).

Which of the following statements is the **best** evaluation of these results?

- **A.** Nolies published better statistics because Nolies reported the sampling error, but overall the two companies reported similar results.

- **B.** Sigmas published better statistics because Sigmas reported an exact amount with no error, but overall the two companies reported similar results.

- **C.** Sigmas and Nolies reported different results, so a third survey should be conducted before any conclusions can be drawn.

- **D.** Sigmas and Nolies reported different results, so both companies should survey the same group of teachers again before any conclusions can be drawn.

17. A plane intersects a double-napped right circular cone. The plane is parallel to the base of the cone and passes through the vertex. The locus produced by the intersection of the cone and the plane is

   A. a line
   B. a point
   C. a circle
   D. an ellipse

18. Using a computer, Michele and Robin graphed a quadratic relation defined by $25x^2 + 16y^2 + 30x - 400 = 0$. Now they wish to graph a circle. Which value should Michele and Robin increase to graph the circle?

   A. The coefficient of x^2
   B. The coefficient of y^2
   C. The coefficient of x
   D. The constant term

19. The graphs of the function $f(x) = \log_4(x)$ and its inverse are to be drawn on the same set of axes. In this situation, the graph of the inverse of the function $f(x) = \log_4(x)$ can be expressed by

   A. $y = 4^x$

   B. $y = x^4$

   C. $x = 4^y$

   D. $x = y^4$

20. Written as a single logarithm, $\log_2(a) + \log_2(b) - \log_2(c^2)$ is

   A. $\log_2 \dfrac{ab}{c^2}$

   B. $\log_2 \dfrac{ab}{2c}$

   C. $\log_2(a + b - c^2)$

   D. $\log_2(a + b - 2c)$

21. In the equation $2\left(\dfrac{1}{3}\right)^{2m+1} = 54$, the value of m is

    A. $\dfrac{13}{3}$

    B. $\dfrac{4}{3}$

    C. -1

    D. -2

22. If $\log_x\left(\dfrac{4}{9}\right) = -2$, then x equals

    A. $\dfrac{81}{16}$

    B. $\dfrac{16}{81}$

    C. $\dfrac{2}{3}$

    D. $\dfrac{3}{2}$

23. If $2^{\log_2(x)\ +\ \log_2(5)} = 16$, then the value of x is

    A. -1
    B. 1.25
    C. 3.2
    D. 11

24. In the process of solving $\log_3(x + 3) + \log_3(x - 4) = 2$, a correct equation that can arise is

    A. $(x + 3)(x - 4) = 2$
    B. $(x + 3)(x - 4) = 6$
    C. $(x + 3)(x - 4) = 8$
    D. $(x + 3)(x - 4) = 9$

25. If $0 < \theta \leqq 2\pi$, then the values for θ in which $\log_2(\sin \theta) = -1$ are

A. $\dfrac{\pi}{6}$, $\dfrac{11\pi}{6}$

B. $\dfrac{\pi}{6}$, $\dfrac{5\pi}{6}$

C. $\dfrac{5\pi}{6}$, $\dfrac{7\pi}{6}$

D. $\dfrac{7\pi}{6}$, $\dfrac{11\pi}{6}$

26. A building security code consists of a 4-digit natural number with no number repeated. The digits allowed are 1, 2, 3, 4, 5, 6, or 7. How many different 4-digit numbers can be formed?

A. 7!

B. 7^4

C. $7 \times 6 \times 5 \times 4$

D. $7! \times 6! \times 5! \times 4!$

27. A student council has 10 elected members. Each week, four of these members are needed to serve on special committees. The number of different committees that can be formed from the 10 elected members is

A. 24
B. 210
C. 5040
D. 151 200

28. A group of hockey officials consists of four referees and six linesmen. How many ways are there of selecting one referee and two linesmen from this group?

A. 720
B. 60
C. 54
D. 19

29. Three men and three women are planning to sit at a round table. The group decides on a seating plan that alternates man-woman-man-woman-man-woman. How many such arrangements are possible?

    A. 6
    B. 12
    C. 18
    D. 36

30. A home owner wants to purchase two different pictures, one to hang above a hall table and one to hang above a sofa. An interior decorator arrives at the home with several different pictures and shows the owner all 42 different arrangements. How many different pictures did the decorator show the home owner?

    A. 5
    B. 6
    C. 7
    D. 8

31. The German word for street is *STRASSE*. How many arrangements of the letters *S-T-R-A-S-S-E* are possible if each arrangement must begin with 2 *S*'s and the third letter must not be an *S*?

    A. 96
    B. 120
    C. 360
    D. 720

32. The numerical coefficient of the third-degree term in the expansion of $(2x - 1)^5$ is

    A. -80
    B. -10
    C. 10
    D. 80

33. A set of numbers that serves as an example of a finite sequence is the set of all

    A. odd positive numbers
    B. even positive numbers
    C. positive factors of 64
    D. positive multiples of 64

34. An example of a general term, t_n, that will generate a geometric sequence is

    A. $t_n = 3n^2$

    B. $t_n = n(3)^{n-1}$

    C. $t_n = -3(2)^{n+4}$

    D. $t_n = 5 - 3n$

35. An outdoor theatre has 25 rows of seats. There are 10 seats in the first row, and each subsequent row has d seats more than the preceding row. If there are 1150 seats altogether, then the value of d is

    A. 6
    B. 5
    C. 4
    D. 3

36. For an arithmetic sequence, $t_{45} = 368$ and $t_{46} = 377$. The value of the first term is

    A. -28
    B. -37
    C. 28
    D. 37

37. A team in a relay race is made up of 6 members. The first team member runs 1500 m, and each successive team member carries the baton three-quarters of the distance run by the previous member. Correct to the nearest metre, the total length of the race run by the 6 team members is

    A. 4576 m
    B. 4932 m
    C. 5567 m
    D. 6000 m

38. The expression $\displaystyle\sum_{n=1}^{3} (3n) + \sum_{n=3}^{5} (2n - 1)$ is equal to

A. 39
B. 42
C. 70
D. 145

39. During each 25-year period, an isotope of strontium has its initial mass reduced by a factor of $\frac{1}{2}$. The initial mass of a sample of strontium is 36 mg. The mass of this sample after 325 years is

A. 0.0022 mg
B. 0.0044 mg
C. 0.0088 mg
D. 0.0176 mg

40. A culture of bacteria is being studied in a genetics experiment. The researcher observes that the bacteria double in number every 15 min. After 8 h, the number of bacteria in the culture is N. At this rate, how long will it take for the total population of bacteria to reach $16N$?

A. 9 h

B. $9\frac{1}{4}$ h

C. 16 h

D. 128 h

YOU HAVE NOW COMPLETED PART A. PROCEED DIRECTLY TO PART B.

PART B

INSTRUCTIONS

In this part of the examination, there are seven numerical-response questions each with a value of one mark. All numbers used in the questions are to be considered as **exact** numbers and are not the result of a measurement.

Read each question carefully.

Record your answer on the answer sheet provided by writing it in the boxes and filling in the corresponding circles.

Enter the first digit of your answer in the left-hand box and leave any unused boxes blank.

Use an HB pencil only.

Answer Sheet

1. If θ is acute and $\sin \theta = 0.6735$, then the measure of θ correct to the nearest tenth of a degree is _____ .

    $\theta = 42.33777464...°$

    Record 42.3

2. For the arithmetic series $-8 + (-5) + (-2) + \ldots + (85)$, the number of terms is _____ .

    $85 = -8 + (n - 1)(3)$

    $93 = 3n - 3$

    $n = 32$

    Record 32

If you wish to change an answer, erase **all** traces of your first answer.

START PART B IMMEDIATELY.

1. When $P(x) = x^3 + 10x^2 - 4x - 10m$ is divided by $x + 4$, the remainder is 2. The value of m correct to the nearest tenth is _____ .
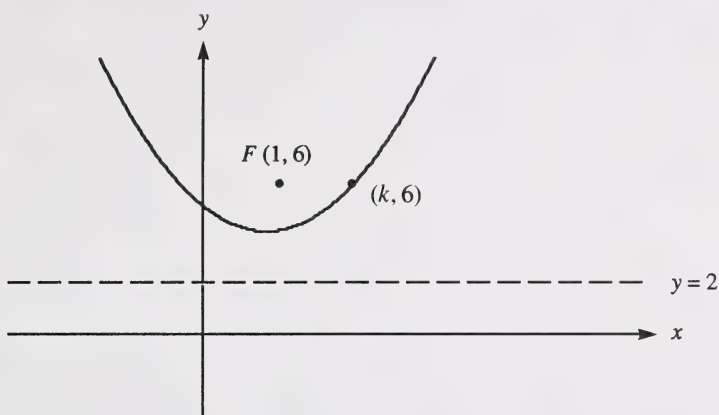
2. If $\sec^2 \theta = 4.8065$, then $\tan^2 \theta$ correct to the nearest tenth is _____ .

3. A university biology class consists of 200 students. The marks of the final examination are normally distributed with a mean mark of 45.0 and a standard deviation of 5.3. The professor adjusts the marks by adding 5.0 to each grade. Correct to the nearest tenth, the standard deviation of the adjusted marks is _____ .
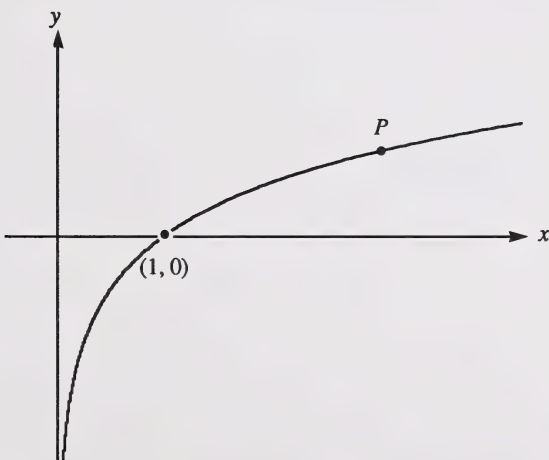
4. The parabola below is defined by a fixed point (focus) $F(1, 6)$ and a fixed line (directrix) $y = 2$. Correct to the nearest tenth, the value of k is _____ .

$F(1, 6)$

$(k, 6)$

$y = 2$

5. The sketch of the graph of $y = \log_2(x)$ is shown below. If $P(x, 1.54)$ is a point on this graph, then the value of x correct to the nearest hundredth is _____ .

P

$(1, 0)$

6. Two free admission tickets to a waterpark are being given away. In order to determine who will receive the tickets, your name and the names of 27 of your classmates are put in a hat. All names have an equal chance of being drawn. Expressed as a **percentage**, correct to the nearest hundredth, the probability that your name will be amongst the two chosen is _____ %.

7. The circumference of each wheel on a locomotive is 2.4 m. When the engineer applies the brakes of the locomotive, the wheels make 14 revolutions during the first second, 12.5 revolutions during the next second, 11 revolutions during the third second, and so on. This stopping pattern forms an arithmetic sequence. Correct to the nearest tenth of a metre, the distance that the locomotive travels during the eighth second is _____ m.

YOU HAVE NOW COMPLETED PART B. PROCEED DIRECTLY TO PART C.

PART C

1. You are helping your friend analyse the graphs of trigonometric functions. Your friend wants to know the effects of the parameters a, b, c, and d in $y = a \sin b(\theta + c) + d$. You start by graphing $y = \sin \theta$ and $y = \frac{1}{2} \sin\left(\theta + \frac{\pi}{4}\right) - 2$ as shown below.
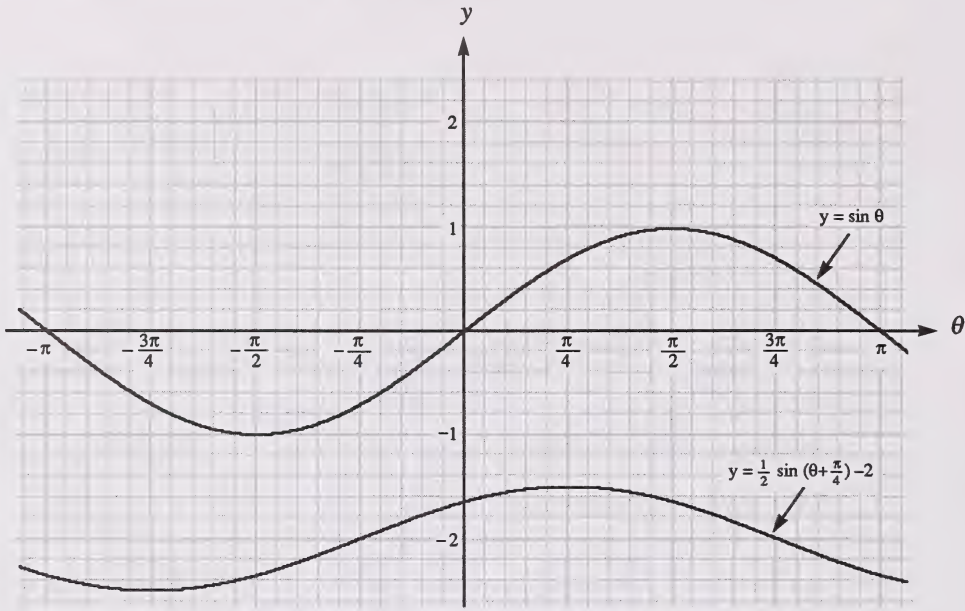
Describe the effects of the parameters $\frac{1}{2}$, $+\frac{\pi}{4}$, and -2 on the graph of $y = \sin \theta$.

If you require more space to answer question 1, you may use this page.

2. Before class ended, Gene and Alex started drawing the graph of the same conic. Both drew the fixed line (directrix) and plotted a fixed point (focus). Just as the bell rang to end the class, Gene and Alex plotted two other points, A and B, on the conic. Below, on the Cartesian plane, is Gene's graph. On the following page, drawn on the circle line grid, is Alex's graph.

Complete **either** Gene's **or** Alex's graph. Show how you decided which conic the students were drawing.

Gene's Graph

$x = 4$
directrix
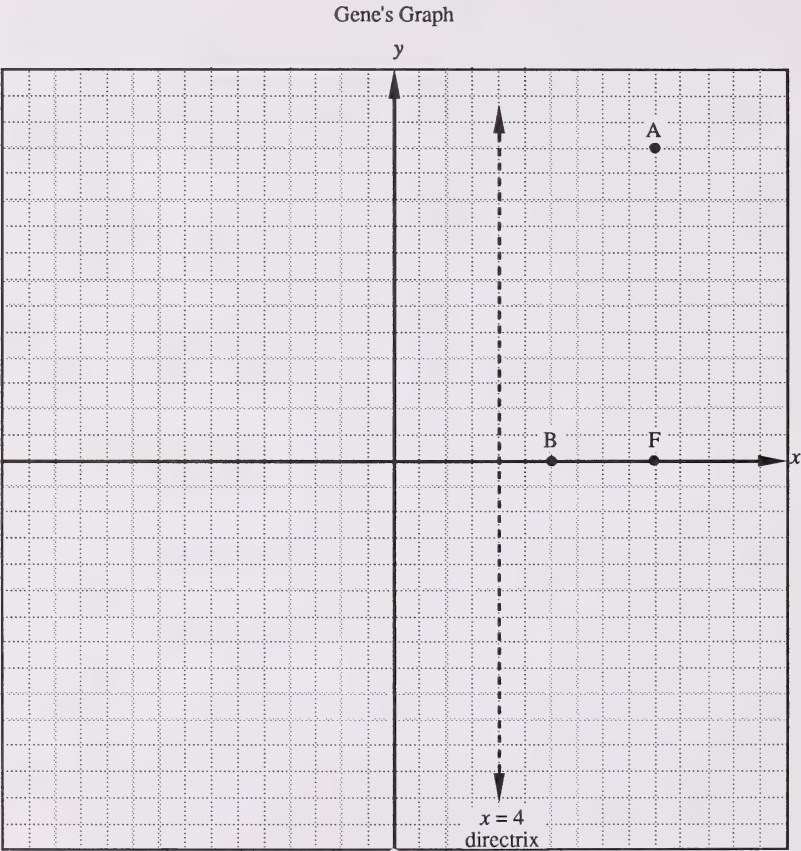
Alex's Graph
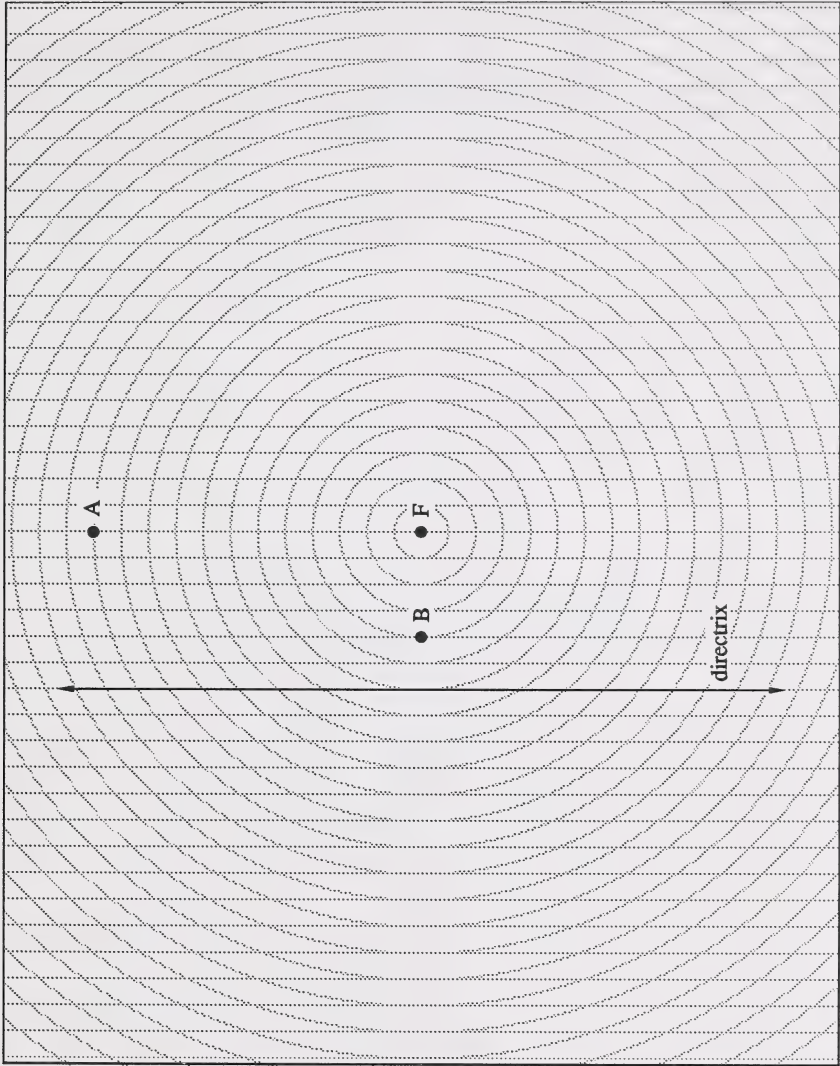
3. Forty bus commuters were asked if they believed their bus service was
    adequate. Sixteen of the 40 commuters answered ''yes''.

    a. Using the ''90% Box Plots from Samples of Size 40'' tear-out page near
        the end of this booklet, determine the 90% confidence interval for the
        percentage of yeses in the population.

    b. Describe what is meant by this 90% confidence interval.

c. How would this confidence interval change if the sample size increased?

4. This is a partial sketch of the graph of a polynomial function with domain $-8 \leqq x \leqq 5$. There are no other x-intercepts.
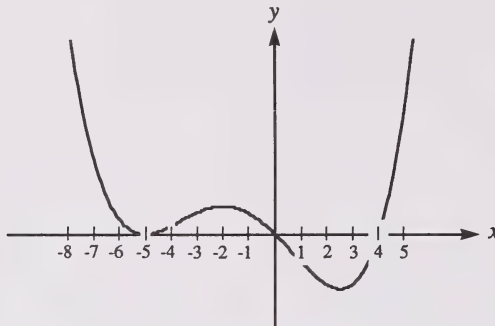
a. What are the zeros of this polynomial?

b. What is the lowest possible degree of this polynomial?

c. What other degrees **could** this polynomial be? Explain your answer.

YOU HAVE NOW COMPLETED THE EXAMINATION. IF YOU HAVE TIME, YOU MAY WISH TO GO BACK AND CHECK YOUR ANSWERS.

MATHEMATICS 30 FORMULA SHEET

The following information may be useful in writing this examination.

I. Polynomial Functions

- $P(x) = D(x)Q(x) + R$

- The roots of a quadratic equation are
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

II. Trigonometry

- arc length $a = r\theta$

- $\sec A = \dfrac{1}{\cos A}$

- $\csc A = \dfrac{1}{\sin A}$

- $\cot A = \dfrac{\cos A}{\sin A}$

- $\sin^2 A + \cos^2 A = 1$

- $1 + \tan^2 A = \sec^2 A$

- $1 + \cot^2 A = \csc^2 A$

- $\sin(A + B) = \sin A \cos B + \cos A \sin B$

- $\sin(A - B) = \sin A \cos B - \cos A \sin B$

- $\cos(A + B) = \cos A \cos B - \sin A \sin B$

- $\cos(A - B) = \cos A \cos B + \sin A \sin B$

III. Statistics

- $z = \dfrac{x - \mu}{\sigma}$

- $y = mx + b$

IV. Quadratic Relations

- $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$

- $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

- eccentricity $e = \dfrac{|PF|}{|PD|}$, where F = focus,

  D = directrix, and

  P = point on the conic

V. Permutations and Combinations

- $n! = n(n - 1)(n - 2)...(3)(2)(1)$

- $_nP_r = \dfrac{n!}{(n - r)!}$

- $_nC_r = \dfrac{n!}{r!(n - r)!}$

- $(x + y)^n = {}_nC_0 x^n + {}_nC_1 x^{n-1}y + {}_nC_2 x^{n-2}y^2 + ... + {}_nC_k x^{n-k}y^k + ... + {}_nC_n y^n$

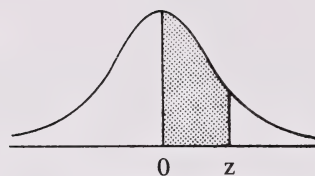General Term
$$t_{k+1} = {}_nC_k x^{n-k}y^k$$

VI. Sequences and Series

- $t_n = a + (n - 1)d$

- $S_n = \dfrac{n(a + t_n)}{2}$

- $S_n = \dfrac{n[2a + (n - 1)d]}{2}$

- $t_n = ar^{n-1}$

- $S_n = \dfrac{a(r^n - 1)}{r - 1}, r \neq 1$

AREAS UNDER THE STANDARD NORMAL CURVE
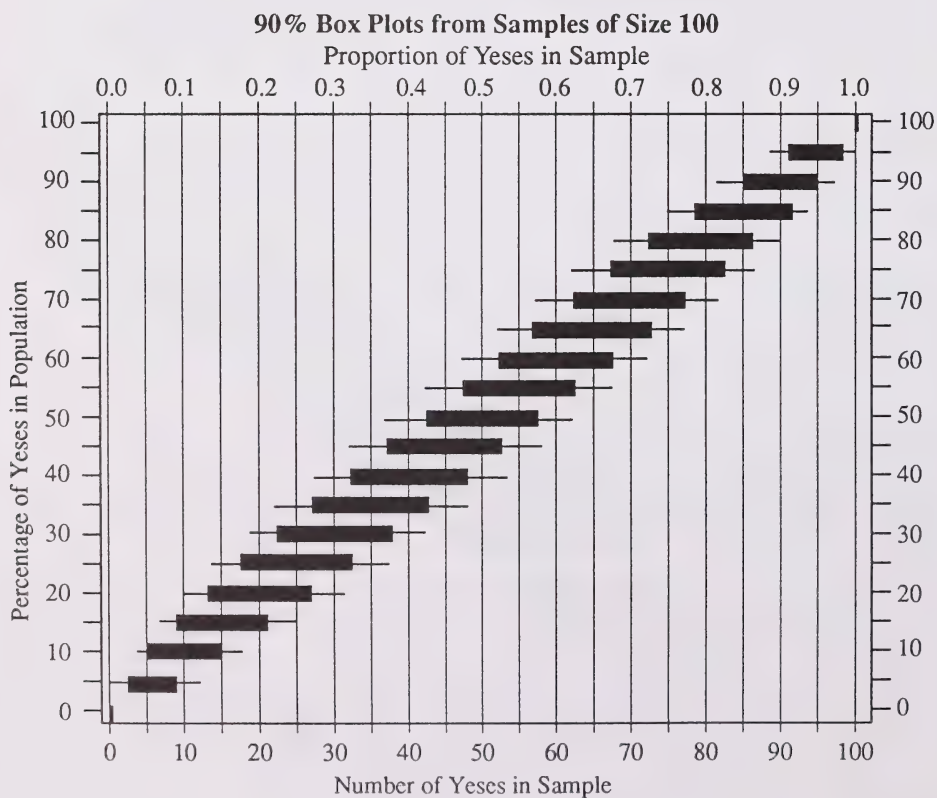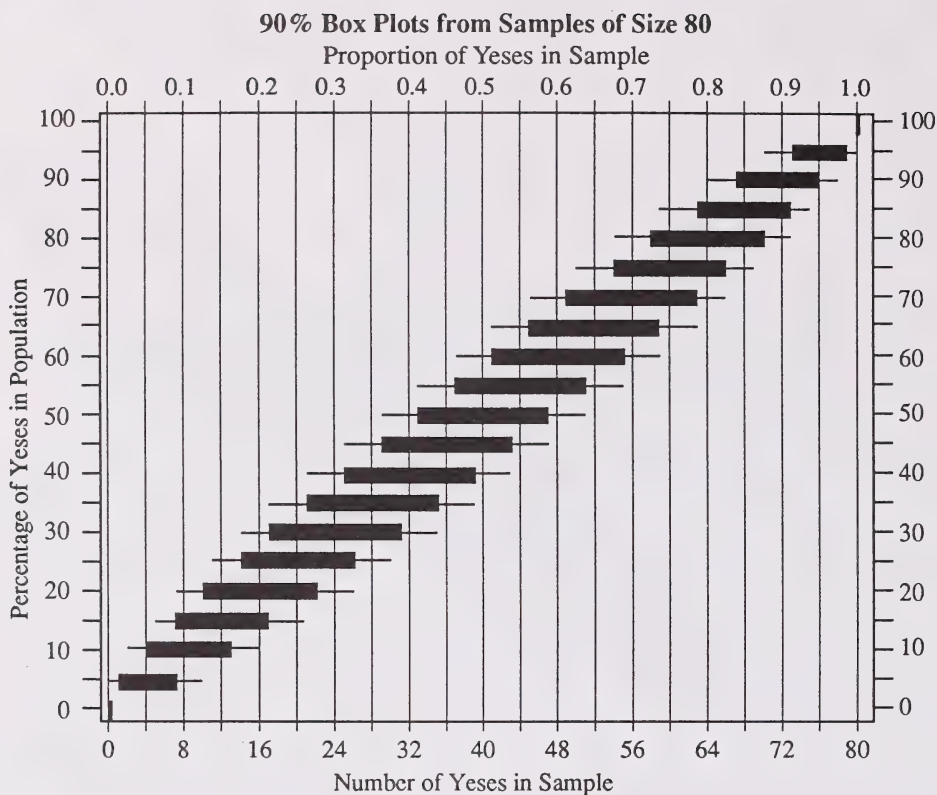
z	0	1	2	3	4	5	6	7	8	9
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0754
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2258	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518	0.2549
0.7	0.2580	0.2612	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2996	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

FOLD AND TEAR ALONG PERFORATION
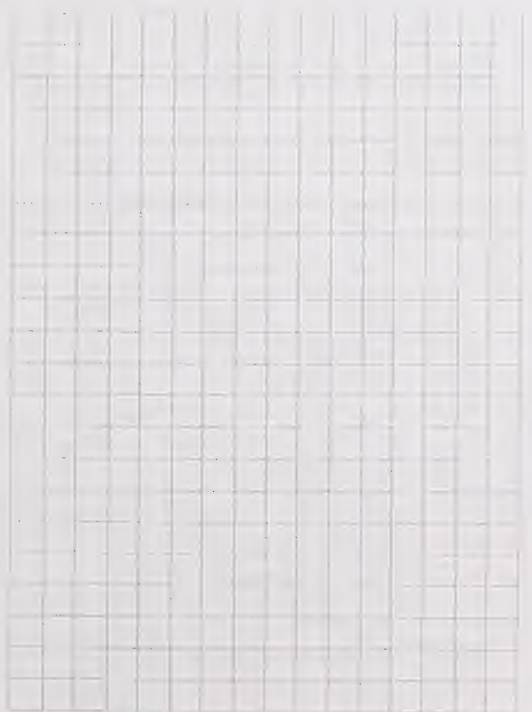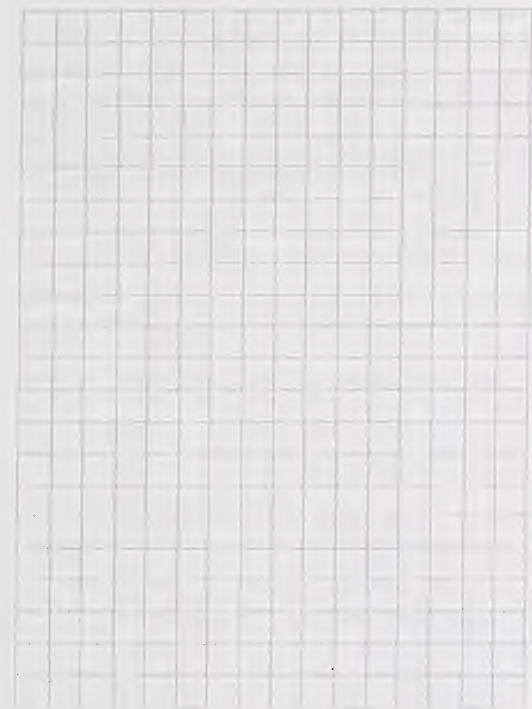
FOLD AND TEAR ALONG PERFORATION

All four tables from *Exploring Surveys and Information from Samples* by James M. Landwehr,
Jim Swift, Ann E. Watkins (Palo Alto, Ca: Dale Seymour Publications). Reprinted by permission.

90% Box Plots from Samples of Size 20
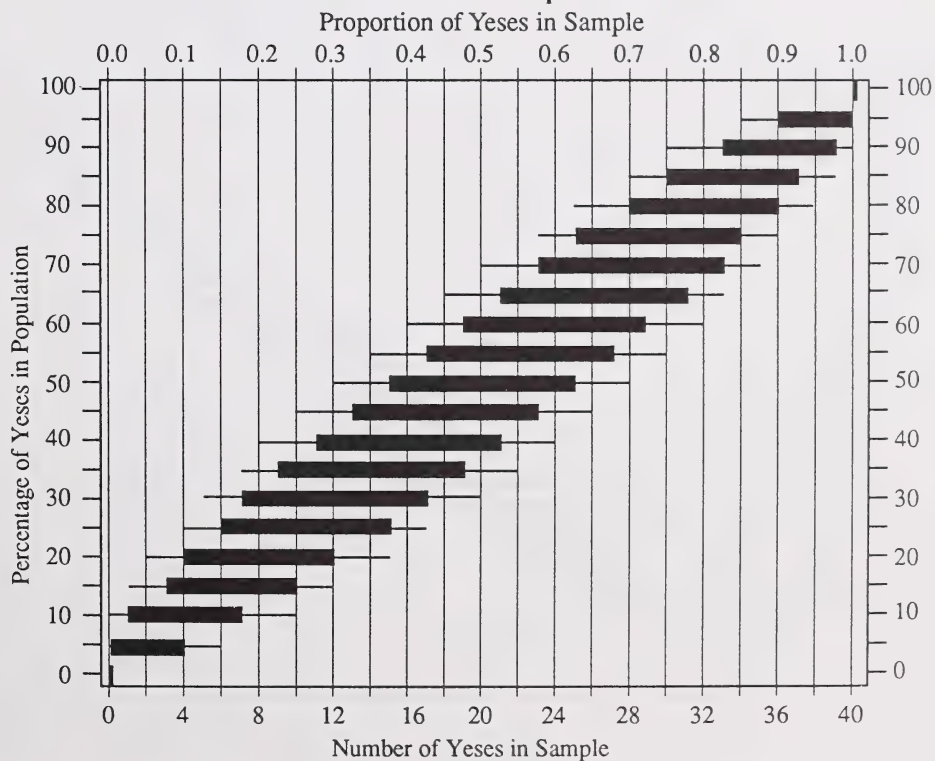
Proportion of Yeses in Sample

Number of Yeses in Sample

90% Box Plots from Samples of Size 40

Proportion of Yeses in Sample

Number of Yeses in Sample

90% Box Plots from Samples of Size 80

Proportion of Yeses in Sample

Percentage of Yeses in Population

Number of Yeses in Sample

90% Box Plots from Samples of Size 100

Proportion of Yeses in Sample

Percentage of Yeses in Population

Number of Yeses in Sample

FOLD AND TEAR ALONG PERFORATION

MATHEMATICS 30

June 1992

NAME: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

(LAST NAME)

☐☐☐☐☐☐☐☐☐☐☐☐

(FIRST NAME)

PERMANENT MAILING ADDRESS: ☐☐☐☐☐☐☐☐☐☐☐☐☐

(Apt./Street/Ave./P.O. Box)

_____

(Village/Town/City)

DATE OF BIRTH: ☐☐ Y ☐☐ M ☐☐ D   SEX: ☐

SCHOOL CODE: ☐☐☐ ☐   SCHOOL: _____

SIGNATURE: _____

_____ (Postal Code)

APPLY LABEL WITHOUT STUDENT'S NAME

MATHEMATICS 30

APPLY LABEL WITH STUDENT'S NAME

MATHEMATICS 30